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ABSTRACT

Definitions of computer literacy, educational planning concerns, topics for a computer literacy course, computer literacy for teachers, and a community computer literacy project are addressed in this review of literature. Although no agreement exists among computer experts about what computer literacy is or should be, it is apparent that a national program of computer literacy need not have as its goal a single curriculum or set of requirements for everyone. It has been agreed that computer literacy should be available to all students, with the elementary and secondary schools bearing the largest responsibility for instruction. Some of the issues involved in planning for a computer literate society include: the question of whether computer-related skills are needed by everyone; provision for inservice and preservice teacher training; the political, social, and economic implications of computer technology; isolation and separatism among students using computers; and health and safety aspects. Course topics could include history of computers, programming, computer systems, and the social effects of computers. Community educators can sponsor a computer literacy project at a public library, offering "hands-on" instruction for patrons. A list containing curriculum materials on computer literacy, examples of recent journal articles on the topic, and general reference sources are also provided. (KC)

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COMPUTER LITERACY, IN BRIEF: AN ERIC FACT SHEET

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Dec 82

ERIC Clearinghouse On Information Resources

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IN BRIEF...

COMPUTER LITERACY
—An ERIC Fact Sheet—

Definition of Computer Literacy

The definition of computer literacy is constantly changing as people become more aware of the capabilities and usage of computers. The affordability and increasing prevalence of microcomputers have hastened this evolutionary process. An early definition simply states that "computer literacy is knowing about computers. What they are, how they work, and what they can and cannot do" (Ball, 1972, cited in Sadowski). In 1979, Billings and Moursund include the need to know about the societal impact of computers and the potential for future developments in their definition, as well as a "knowledge of the non-technical and low-technical aspects of the capabilities and limitations of computers." Moursund (1981) later elaborates that computer literacy is essential for using the computer in its various capacities: as an aid to learning (both in the tutor mode--computer acts on the student--and the tutee mode--student acts on the computer), as an aid to problem solving, as a discipline in itself (i.e., computer and information science), as entertainment, and as part of the future in scientific and technological progress. He stressed that students would need to continue to use their computer knowledge and skills to maintain functional computer literacy, and that access and encouragement would need to be provided throughout their years in school. In an introductory textbook, Horn and Poirot (1981) include sections on flowcharting and programming in BASIC for students who want more depth, and explain that the knowledge and skills needed to be considered computer literate will change as the technology becomes more advanced.

Watt (1980) defines computer literacy as a "cultural phenomenon which includes the full range of skills, knowledge, understandings, values and relationships necessary to function effectively and comfortably as a citizen of a computer-based society" (p. 57). He lists the following components of his definition: "(1) the ability to control and program a computer to achieve a variety of personal, academic, and professional goals; (2) the ability to use a variety of pre-programmed computer applications in personal, academic, and professional contexts; (3) the ability to make use of ideas from the cultures surrounding computer programming and computer applications as part of an individual's collection of strategies for information retrieval, communication, and problem solving; (4) the ability to understand the growing economic, social, and psychological impact of computers on individuals and groups within our society and on society as a whole" (pp. 57-59). He feels that mere knowledge of computers should be considered computer awareness.

In a 1982 article for Curriculum Review, Inskeep's more inclusive definition also includes: knowing the history and development of computers, understanding the different types of computers that are in use, and being able to evaluate computer programs. He notes that the computer can be used to benefit the teacher as well as the student, in recordkeeping and housekeeping chores, for improved student evaluation and diagnosis, as a resource for teaching ideas, and as a classroom aide.

Thus it appears that there is no agreement as to what computer literacy is or should be, even among computer experts. Anderson (1980) suggests that this need not be a problem, if one accepts the fact that "computer literacy is a matter of functioning effectively within a given role" (p. 12). Since not all people who will be working in the computer field will need a high level of understanding, a national program of computer literacy need not have as its goal a single curriculum or set of requirements for everyone.

Brumbaugh (1980) further emphasizes that whatever the definition of computer literacy becomes, and whether or not programming is one of the requirements, the primary focus should be on individualization of instruction, with learner-based materials available to everyone, at all educational levels.

Significance of Computer Literacy

The National Science Foundation (NSF) was directed by President Nixon and Congress in 1969 to "provide a leadership role in the use of computing in science in education in the United States" (Deringer and Molnar, 1980, p. 2). Four years later, the Conference Board of the Mathematical Sciences Committee on Computer Education recommended universal computer literacy in a report entitled Recommendations Regarding Computers in High School Education (Moursund, 1981). At a 1980 conference entitled "National Goals for Computer Literacy in 1985" (sponsored by NSF under a grant awarded to the Minnesota Educational Computing Consortium and organized by the Human Resources Research Organization), 90 people ranging from classroom teachers to computer scientists met to determine how to create an educational system to insure a computer-literate society in the United States. It was felt that computer literacy should be available to all students, with the elementary and secondary schools bearing the largest responsibility for instruction (Anderson, 1980). Participants agreed that computers were essential in dealing with such national issues as declining productivity, increased foreign trade competition, and national defense needs, and that a nationwide effort to educate people in their use was imperative. Key components for achieving computer literacy were defined as: (1) recognizing that computer literacy is multi-faceted; (2) identifying and developing knowledgeable people to create new tools and materials and to be able to use them; (3) involving the home, work place, and community, as well as schools; (4) providing computers for instruction in schools for all students; (5) providing high quality courseware; and (6) continuing to identify new opportunities (Deringer and Molnar, 1980).

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Watt (1980) wrote that the impact of computers will be felt both at work, where an overwhelming majority of those working in the future will have daily, significant, and direct interactions with computers, and at home, where they will be used for recreation, business and household management, and educational development.

Areas of Concern to Be Considered in the Planning Process

The following issues, some of many which would need to be addressed in planning for a computer literate society, were discussed in papers by Daniel Watt, Research Associate at the MIT LOGO group (1980); Cheryl Anderson, Assistant Professor at the University of Texas at Austin (1982); and Barbara Florini, Associate in Development at the Center for Instructional Development, Syracuse University (1982):

1. Are computer-related skills needed by everyone, or should they be part of vocational and business education training for those who plan to enter computer-related professions?
2. If everyone needs to be computer literate, how can this be accomplished? The schools have limited equipment and teachers lack training and expertise in this area; who should provide computer access? How can equal access be provided to all students: poor as well as rich, female as well as male? All students will need to have equal opportunity to experience the computer as a problem solving tool, rather than merely to use it for drill and practice.
3. How will preservice and inservice teacher education be provided for? There will be problems retraining and recruiting teachers due to lower salaries in education than in the computer industry.
4. Man machine interactions must be taken into consideration: many students and teachers will be afraid of the technology.
5. What are the political, social, and economic implications of computer technology?
6. Computer use may lead to isolation and separatism among students.
7. If only one approach is focused upon, will only some of the students become comfortable with computers?
8. More research needs to be done to see if different styles of relating to computers result in transfer to non-computer situations (e.g., problem solving).
9. What precautions are needed to guard against unacceptable uses of computers?
10. Are there health and safety aspects related to the manufacture and use of computers?

Topics that Might Be Covered in a Computer Literacy Course

This list of topics was compiled from four sources (Horn and Poirot, 1981; Heller and Martin, 1982; Billings and Moursund, 1979; Sadowski, 1981). It is intended to provide ideas for course component options, rather than to be used as is, since each computer literacy course would need to be structured according to the needs of the participants and the skills of the teachers involved.

1. What is computer literacy? (in the context of the course being taught)
2. The history of computers and why they exist
3. What is a computer? Include computer jargon and definitions.
4. How do computers work? Include capabilities and limitations, components and their functions, hardware and software.
5. Computer applications, e.g., business, agriculture, health, environment, transportation, arts, government; what computers can do for people
6. How computers affect people's lives; what people think of computers
7. Computer-related careers; where do we fit into the computer picture?
8. The value of information in society--social, legal, educational implications
9. Future implications; what else is there to know?
10. Algorithms and flowcharting
11. Computer programming (BASIC, LOGO, Pascal; there is no real agreement on which language is best to use)
12. Computer systems; systems design; design logic

Computer Literacy for Teachers

Bork (1980) suggests that the computer could be used to aid the teachers' learning individually, and that administrators should buy materials for the teachers to use in their own training and during inservice courses. He proposes the following areas for inclusion in a core program which would be individually tailored to each group: (1) learning theory background, (2) types of computer uses in education, (3) development of computer-based learning materials, (4) structured thinking and programming, (5) algorithms, and (6) an introduction to programming. Braun (1980) adds that teachers need to learn how the computer is used as a learning environment for their students.

A teacher awareness course at Minot High School in North Dakota comprised five three-hour sessions, with each one to include instruction and hands-on experience. Nansen (1982) listed the following course objectives: (1) help the teachers feel comfortable using the computer, (2) familiarize them with good quality educational software programs, (3) show them how to copy single programs and entire disks, (4) teach them to set up a computer from scratch, and (5) introduce them to a variety of professional or utility programs.

In Moursund's guide for elementary school teachers (1980), he suggests that they increase their awareness by noticing computers they encounter in everyday life, talking about computers with others who are interested and trying computer activities, taking a computer science course, and subscribing to and reading computer-oriented publications.

Community Computer Literacy Project

In September 1981, the National Science Foundation funded a public access computer literacy project, ComputerTown USA!, at the Menlo Park Public Library in California. The project goal was to make the entire community computer literate, by "providing hands-on computer experiences for new to intermediate potential microcomputer users, assisting

those people in becoming comfortable, aware, and informed about this technology" (Loop, et al., 1982, p. 1). Classes, workshops, play days, demonstrations, question and answer sessions, study groups, and lectures were held at various sites in addition to continuous access at the public library. Sponsors publish The ComputerTown USA News Bulletin, plan to develop an implementation package so that other communities can establish similar computer literacy projects in informal learning environments, and ultimately hope to create a network. For more information, write to ComputerTown International, P.O. Box E, Menlo Park, CA 94025 (Loop, et al., 1982).

Sources of Curriculum Materials

Educational Resources Information Center (ERIC). The ERIC information system provides access to educational documents (e.g., research reports, curriculum materials, bibliographies, state-of-the-art papers, conference papers) and periodical articles through its monthly indexes Resources in Education (RIE) and the Current Index to Journals in Education (CIJE), respectively. Computer literacy was added as an ERIC subject heading (descriptor) in April 1982, and is defined as "awareness of or knowledge about computers (their capabilities, applications, and limitations)--may include the ability to interact with computers to solve problems." As of November 1982 the term had been used 137 times to describe the contents of documents and journal articles. Examples of recent document titles from RIE which would be useful in curriculum planning at various educational levels follow. All are available in microfiche and paper copy from the ERIC Document Reproduction Service (EDRS), P.O. Box 190, Arlington, VA 22210.

Diem, R. A. The role of technology in teacher education: Preparation for the twenty-first century classroom. 1982, 13pp. ED 212 396, MF-$.97/PC-$2.15 plus postage.

Joseph, H. Lessor plan for computer literacy unit (3 weeks). Grades 7-9. Revised. 1982, 50pp. ED 216 898, MF-$.97/PC-$3.90 plus postage.

Masat, F. E. Computer literacy in higher education. AAHE-ERIC/Higher Education Research Report Number 6. Washington, DC: American Association for Higher Education; ERIC Clearinghouse on Higher Education, 1981, 63pp. ED 214 446, MF-$.97/PC-$5.65 plus postage.

Mayer, R. E. Contributions of cognitive science and related research on learning to the design of computer literacy curricula. Report no. 81-1. Series on learning and cognition. Santa Barbara: University of California, 1980, 35pp. ED 207 551, MF-$.97/PC-$3.90 plus postage.

Nordman, R., & Parker, J. Teaching computer literacy in an elementary school: A comparison of two methods using microcomputers. Report no. 81:18. Vancouver: Educational Research Institute of British Columbia, 1981, 165pp. ED 213 400, MF-$.97/PC-$12.65 plus postage.

Patton, R., et al. Computer literacy for all high school students. 1981, 26pp. ED 216 679, MF-$.97/PC-$3.90 plus postage.

Examples of recent journal articles from CIJE follow. They can be obtained from a library, borrowed through interlibrary loan, or, if so indicated, ordered through UMI, 300 N. Zeeb Road, Ann Arbor, MI 48106.

Caldwell, R. M. Computer and computer courseware: New directions for helping children learn. Journal of Children in Contemporary Society, Fall 1981, 14(1), 55-71. (EJ 266 606)

Gress, E. K. A computer-literacy model for the junior high school. Arithmetic Teacher, March 1982, 29(7), 46-49. (Reprint UMI: EJ 260 447)

Marshall, D. G. The school administrator and the microcomputer. Education Canada, Summer 1982, 22(2), 4-11. (Reprint UMI: EJ 266 064)

Olds, H. F. Teaching the teachers: An inservice syllabus. Classroom Computer News, September-October 1981, 2(1), 12-15, 40. (EJ 260 504)

Rawitsch, D. G. Minnesota's statewide push for computer literacy. Instructional Innovator, February 1982, 27(2), 34-35. (Reprint UMI: EJ 258 279)

Robinson, S. P. Microcomputers in the classroom: Questions for teachers. Today's Education: Social Studies Edition, April-May 1982, 71(2), 29-30. (EJ 260 646)

For more information about ERIC resources in this area, contact the ERIC Clearinghouse on Information Resources, Syracuse University, School of Education, Syracuse, NY 13210 (315/423-3640).

Electronic Learning. This periodical is published by Scholastic, Inc. (50 West 44th Street, New York, NY 10036; $19.00/year) and comes out monthly during the school year. In September 1982 (Volume 2, number 1) they began a five-part series on computer literacy curriculum planning, written by Gary G. Bitter, Professor of Computer Education at Arizona State University in Tempe. The first article includes a scope and sequence chart which lists topics that might be taught in computer literacy courses at the elementary/secondary level, and recommended grade levels for introducing them. The succeeding articles focus on particular objectives to be covered in grades K-3, 4-6, 7-9, and 10-12, respectively, along with suggested teaching activities (Bitter, 1982).

Microcomputer Index. Published by Microcomputer Information Services (2464 El Camino Real, Box 247, Santa Clara, CA 95051), this quarterly index provides subject access to and abstracts for microcomputer articles from over 25 periodicals. It is now available for online searching through DIALOG Information Services, 3460 Hillview Avenue, Palo Alto,

CA 94304 (800/227-1960 or 800/982-5838 in California) as File 233 ($45.00 per connect hour). The database will begin with about 12,000 records from 1981 to the present and be updated monthly with about 700 new records.

Resources in Computer Education (RICE). A database created by the Computer Technology Program of the Northwest Regional Educational Laboratory, coordinator of the MicroSIFT project, RICE contains current information about computer education and resources including descriptions, evaluations, and producers of software packages and computer literacy objectives and test items. The database is available for online searching through the School Practices Information Network of Bibliographic Retrieval Services, 1200 Route 7, Latham, NY 12110 (518/783-1161 or 800/833-4707), and should contain 2,000 citations by 1983; it dates from 1979 to the present and is updated bi-monthly.

School Practices Information File. This database contains educational practices, programs, and materials currently in operation or use. It is available through the School Practices Information Network of the Education Service Group, Bibliographic Retrieval Services, 1200 Route 7, Latham, NY 12110 (518/783-1161 or 800/833-4707), and was established to provide educators with access to information about validated and exemplary educational practices in a centralized file, as well as network linkages between agencies. A search of this file in November 1982 yielded 34 items about computer literacy, including descriptions of such items as curriculum guides, program descriptions, textbooks, and games.

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Bitter, G. The road to computer literacy: A scope and sequence model. Electronic Learning, September 1982, 2(1), 60-63.

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Heller, R. S., & Martin, C. D. Bits 'n bites about computing: A computer literacy primer. Rockville, MD: Computer Science Press, 1982.

Horn, C. E., & Poirot, J. L. Computer literacy: Problem solving with computers. Austin, TX: Sterling Swift, 1981.

Inskeep, J. E., Jr. Computer literacy: What it is and why we need it. Curriculum Review, May 1982, 21(2), 138-141.

Loop, L., Anton, J., & Zamora, R. ComputerTown: A do-it-yourself community computer project. Menlo Park, CA: People's Computer Co., 1982.

Moursund, D. Precollege computer literacy: A personal computing approach. Eugene, OR: University of Oregon, 1981.

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Nansen, C. Teaching computer use--not programming: An outline for a five session course. Electronic Learning, November/December 1982, 2(3), 24, 31.

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